

CLAIMS:

1. A method of displacing a first fluid with a second fluid in a wellbore, comprising:
introducing into the wellbore a wellbore treating fluid to separate the first fluid from the second fluid and to remove the first fluid from the wellbore in advance of the second fluid,
wherein the wellbore treating fluid comprises zeolite and a carrier fluid.
2. The method of claim 1, further comprising a viscosifier.
3. The method of claim 2, wherein the wellbore treating fluid further comprises one or more of an organic polymer, dispersants, surfactants and weighting materials.
4. The method of claim 1 wherein the zeolite is represented by the formula:
$$M_{a/n}[(AlO_2)_a(SiO_2)_b] \cdot xH_2O$$
where M represents one or more cations selected from the group consisting of Na, K, Mg, Ca, Sr, Li, Ba, NH₄, CH₃NH₃, (CH₃)₃NH, (CH₃)₄N, Ga, Ge and P; n represents the cation valence; the ratio of b:a is in a range from greater than or equal to 1 and less than or equal to 5; and x represents the moles of water entrained into the zeolite framework.
5. The method of claim 1, wherein the zeolite is selected from the group consisting of analcime, bikitaite, brewsterite, chabazite, clinoptilolite, faujasite, harmotome, heulandite, laumontite, mesolite, natrolite, paulingite, phillipsite, scolecite, stellerite, stilbite, and thomsonite.
6. The method of claim 1, wherein the wellbore treating fluid comprises from about 5 to 90% by weight of the zeolite.
7. The method of claim 6, wherein the wellbore treating fluid comprises from about 60 to 70% by weight of the zeolite.
8. The method of claim 1, wherein the carrier fluid comprises a fluid selected from the group consisting of an aqueous fluid, hydrocarbon-based liquids, emulsions, acids and mixtures thereof.
9. The method of claim 8, wherein the carrier fluid comprises water.

10. The method of claim 9, wherein the wellbore treating fluid comprises from about 45 to 95% by volume of water.

11. The method of claim 9, wherein the wellbore treating fluid comprises from about 65 to 75% by volume of water.

12. The method of claim 2, wherein the viscosifier is selected from the group consisting of colloidal agents, emulsion forming agents, diatomaceous earth and starches.

13. The method of claim 12, wherein the viscosifier is a colloidal agent selected from the group consisting of clays, polymers and guar gum.

14. The method of claim 13, wherein the viscosifier is a clay selected from the group consisting of kaolinites, montmorillonite, bentonite, hydrous micas, attapulgite, sepiolite and laponite.

15. The method of claim 12 wherein the wellbore treating fluid, comprises from about 5 to 80% by weight of the viscosifier.

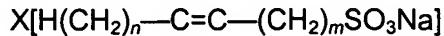
16. The method of claim 12 wherein the wellbore treating fluid, comprises from about 20 to 30% by weight of the viscosifier.

17. The method of claim 3 wherein the organic polymer is selected from the group consisting of guar gum and derivatives thereof, locust bean gum, tara, konjak, tamarind, starch, cellulose, karaya gum, welan gum, xanthan gum, galactomannan gums, succinoglycan gums, scleroglucan gums, tragacanth gum, arabic gum, ghatti gum, tamarind gum, carrageenan and derivatives thereof, carboxymethyl guar, hydroxypropyl guar, carboxymethylhydroxypropyl guar, polyacrylate, polymethacrylate, polyacrylamide, maleic anhydride, methylvinyl ether copolymers, polyvinyl alcohol, polyvinylpyrrolidone, cellulose, carboxyethylcellulose, carboxymethylcellulose, carboxymethylhydroxyethylcellulose, hydroxyethylcellulose, hydroxypropylcellulose, methylhydroxypropylcellulose, methylcellulose, ethylcellulose, propylcellulose, ethylcarboxymethylcellulose, methylethylcellulose and hydroxypropylmethylcellulose.

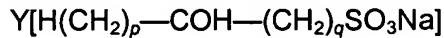
18. The method of claim 17, wherein the organic polymer is selected from the group consisting of hydroxyethylcellulose, carboxymethylhydroxyethylcellulose and guar gum.
19. The method of claim 18, wherein the organic polymer comprises hydroxyethylcellulose.
20. The method of claim 17 wherein the organic polymer is selected from the group consisting of welan gum, xanthan gum, galactomannan gums, succinoglycan gums, scleroglucan gums, and cellulose and its derivatives.
21. The method of claim 17, wherein the wellbore treating fluid comprises from about 0 to 6% by weight of the organic polymer.
22. The method of claim 17, wherein the wellbore treating fluid comprises from about 1 to 3% by weight of the organic polymer.
23. The method of claim 3, wherein the wellbore treating fluid comprises a dispersant selected from the group consisting of sulfonated styrene maleic anhydride copolymer, sulfonated vinyltoluene maleic anhydride copolymer, sodium naphthalene sulfonate condensed with formaldehyde, sulfonated acetone condensed with formaldehyde, lignosulfonates and interpolymers of acrylic acid, allyloxybenzene sulfonate, allyl sulfonate and non-ionic monomers.
24. The method of claim 23, wherein the wellbore treating fluid comprises from about 1 to 18% by weight of the dispersant.
25. The method of claim 23, wherein the wellbore treating fluid comprises from about 9 to 11% by weight of the dispersant.
26. The method of claim 3, wherein the wellbore treating fluid comprises a surfactant selected from the group consisting of nonylphenol ethoxylates, alcohol ethoxylates, sugar lipids, α-olefinsulfonates, alkylpolyglycosides, alcohol sulfates, salts of ethoxylated alcohol sulfates, alkyl amidopropyl dimethylamine oxides and alkene amidopropyl dimethylamine oxides.

27. The method of claim 26, wherein the surfactant is selected from the group consisting of

(a) a sodium salt of α-olefinic sulfonic acid which is a mixture of compounds of the formulas:



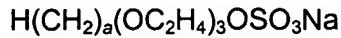
and



wherein:

n and m are individually integers in the range of from about 6 to about 16;
p and q are individually integers in the range of from about 7 to about 17; and
X and Y are fractions with the sum of X and Y being 1;

(b) a composition having the formula:

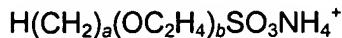


wherein:

a is an integer in the range of from about 6 to about 10;

(c) oxyalkylated sulfonate;

(d) an alcohol ether sulfate of the formula:



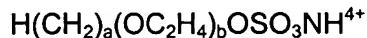
wherein:

a is an integer in the range of from about 6 to about 10; and

b is an integer in the range of from about 3 to about 10;

(e) cocoamine betaine;

(f) an ethoxylated alcohol ether sulfate of the formula:



wherein a is an integer in the range of from about 6 to about 10 and b is an integer in the range of from about 3 to about 10;

(g) an alkyl or alkene amidopropyl betaine having the formula:



wherein R is a radical selected from the group of decyl, cocoyl, lauryl, cetyl and oleyl; and

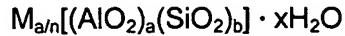
(h) an alkyl or alkene amidopropyl dimethylamine oxide surfactant having the formula:



wherein R is a radical selected from the group of decyl, cocoyl, lauryl, cetyl and oleyl.

28. The method of claim 26, wherein the wellbore treating fluid comprises from about 0 to 20% by volume of the surfactant.
29. The method of claim 26, wherein the wellbore treating fluid comprises from about 2 to 6% by volume of the surfactant.
30. The method of claim 3, wherein the wellbore treating fluid comprises a weighting material and the weighting material is selected from the group consisting of barite, hematite, manganese tetraoxide, ilmenite and calcium carbonate.
31. The method of claim 30, wherein the wellbore treating fluid comprises from about 4 to 85% by volume of the weighting material.
32. The method of claim 30, wherein the wellbore treating fluid comprises from about 15 to 75% by volume of the weighting material.
33. A treating fluid composition comprising:
zeolite and a carrier fluid.
34. The treating fluid composition of claim 33, wherein the treating fluid is selected from the group consisting of drilling fluids, completion fluids and stimulation fluids.
35. The treating fluid composition of claim 33, wherein the treating fluid is selected from the group consisting of drilling muds, well cleanup fluids, workover fluids, conformance fluids, gravel pack fluids, acidizing fluids and fracturing fluids.
36. The treating fluid composition of claim 35, wherein the treating fluid comprises a spacer fluid.
37. The treating fluid composition of claim 33, further comprising a viscosifier.
38. The treating fluid composition of claim 33, further comprising one or more of an organic polymer, dispersants, surfactants and weighting materials.

39. The treating fluid composition of claim 33, wherein the zeolite is represented by the formula:



where M represents one or more cations selected from the group consisting of Na, K, Mg, Ca, Sr, Li, Ba, NH₄, CH₃NH₃, (CH₃)₃NH, (CH₃)₄N, Ga, Ge and P; n represents the cation valence; the ratio of b:a is in a range from greater than or equal to 1 and less than or equal to 5; and x represents the moles of water entrained into the zeolite framework.

40. The treating fluid composition of claim 33, wherein the zeolite is selected from the group consisting of analcime, bikitaite, brewsterite, chabazite, clinoptilolite, faujasite, harmotome, heulandite, laumontite, mesolite, natrolite, paulingite, phillipsite, scolecite, stellerite, stilbite, and thomsonite.

41. The treating fluid composition of claim 33, wherein the treating fluid composition comprises from about 5 to 90% by weight of the zeolite.

42. The treating fluid composition of claim 33, wherein the treating fluid composition comprises from about 60 to 70% by weight of the zeolite.

43. The treating fluid composition of claim 33, wherein the carrier fluid comprises a fluid selected from the group consisting of an aqueous fluid, hydrocarbon-based liquids, emulsions, acids and mixtures thereof.

44. The treating fluid composition of claim 43, wherein the carrier fluid comprises water.

45. The treating fluid composition of claim 33, wherein the treating fluid composition comprises from about 45 to 95% by volume of the carrier fluid.

46. The treating fluid composition of claim 33, wherein the treating fluid composition comprises from about 65 to 75% by volume of the carrier fluid.

47. The treating fluid composition of claim 37, wherein the viscosifier is selected from the group consisting of colloidal agents, emulsion forming agents, diatomaceous earth and starches.

48. The treating fluid composition of claim 47, wherein the viscosifier is a colloidal agent selected from the group consisting of clays, polymers and guar gum.

49. The treating fluid composition of claim 48, wherein the viscosifier is a clay selected from the group consisting of kaolinites, montmorillonite, bentonite, hydrous micas, attapulgite, sepiolite, and laponite.

50. The treating fluid composition of claim 37, wherein the treating fluid composition comprises from about 5 to 80% by weight of the viscosifier.

51. The treating fluid composition of claim 37, wherein the treating fluid composition comprises from about 20 to 30% by weight of the viscosifier.

52. The treating fluid composition of claim 38, comprising an organic polymer selected from the group consisting of guar gum and derivatives thereof, locust bean gum, tara, konjak, tamarind, starch, cellulose, karaya gum, welan gum, xanthan gum, galactomannan gums, succinoglycan gums, scleroglucan gums, tragacanth gum, arabic gum, ghatti gum, tamarind gum, carrageenan and derivatives thereof, carboxymethyl guar, hydroxypropyl guar, carboxymethylhydroxypropyl guar, polyacrylate, polymethacrylate, polyacrylamide, maleic anhydride, methylvinyl ether copolymers, polyvinyl alcohol, polyvinylpyrrolidone, cellulose, carboxyethylcellulose, carboxymethylcellulose, carboxymethylhydroxyethylcellulose, hydroxyethylcellulose, hydroxypropylcellulose, methylhydroxypropylcellulose, methylcellulose, ethylcellulose, propylcellulose, ethylcarboxymethylcellulose, methylethylcellulose and hydroxypropylmethylcellulose.

53. The treating fluid composition of claim 52, wherein the organic polymer is selected from the group consisting of hydroxyethylcellulose, carboxymethylhydroxyethylcellulose and guar gum.

54. The treating fluid composition of claim 53, wherein the organic polymer comprises hydroxyethylcellulose.

55. The treating fluid composition of claim 52, wherein the organic polymer is selected from the group consisting of welan gum, xanthan gum, galactomannan gums, succinoglycan gums, scleroglucan gums, and cellulose and its derivatives.

56. The treating fluid composition of claim 52, wherein the treating fluid composition comprises from about 0 to 6% by weight of the organic polymer.

57. The treating fluid composition of claim 52, wherein the treating fluid composition comprises from about 1 to 3% by weight of the organic polymer.

58. The treating fluid composition of claim 38, comprising a dispersant selected from the group consisting of sulfonated styrene maleic anhydride copolymer, sulfonated vinyltoluene maleic anhydride copolymer, sodium naphthalene sulfonate condensed with formaldehyde, sulfonated acetone condensed with formaldehyde, lignosulfonates and interpolymers of acrylic acid, allyloxybenzene sulfonate, allyl sulfonate and non-ionic monomers.

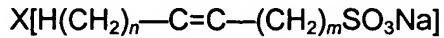
59. The treating fluid composition of claim 58, wherein the treating fluid composition comprises from about 1 to 18% by weight of a dispersant.

60. The treating fluid composition of claim 58, wherein the treating fluid composition comprises from about 9 to 11% by weight of a dispersant.

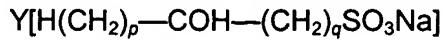
61. The treating fluid composition of claim 38, wherein the treating fluid composition comprises a surfactant selected from the group consisting of nonylphenol ethoxylates, alcohol ethoxylates, sugar lipids, α-olefinsulfonates, alkylpolyglycosides, alcohol sulfates, salts of ethoxylated alcohol sulfates, alkyl amidopropyl dimethylamine oxides and alkene amidopropyl dimethylamine oxides.

62. The treating fluid composition of claim 61, wherein the surfactant is selected from the group consisting of:

(a) a sodium salt of α-olefinic sulfonic acid which is a mixture of compounds of the formulas:



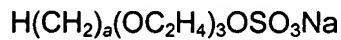
and



wherein:

n and m are individually integers in the range of from about 6 to about 16;
p and q are individually integers in the range of from about 7 to about 17; and
X and Y are fractions with the sum of X and Y being 1;

(b) a composition having the formula:

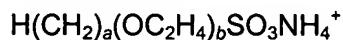


wherein:

a is an integer in the range of from about 6 to about 10;

(c) oxyalkylated sulfonate;

(d) an alcohol ether sulfate of the formula:



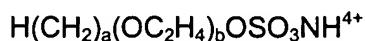
wherein:

a is an integer in the range of from about 6 to about 10; and

b is an integer in the range of from about 3 to about 10;

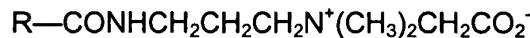
(e) cocoamine betaine;

(f) an ethoxylated alcohol ether sulfate of the formula:



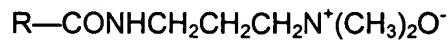
wherein a is an integer in the range of from about 6 to about 10 and b is an integer in the range of from about 3 to about 10;

(g) an alkyl or alkene amidopropyl betaine having the formula:



wherein R is a radical selected from the group of decyl, cocoyl, lauryl, cetyl and oleyl; and

(h) an alkyl or alkene amidopropyl dimethylamine oxide surfactant having the formula:



wherein R is a radical selected from the group of decyl, cocoyl, lauryl, cetyl and oleyl.

63. The treating fluid composition of claim 61, wherein the treating fluid composition comprises from about 0 to 20% by volume of the surfactant.

64. The treating fluid composition of claim 61, wherein the treating fluid composition comprises from about 2 to 6% by volume of the surfactant.

65. The treating fluid composition of claim 38, wherein the treating fluid composition comprises a weighting material selected from the group consisting of barite, hematite, manganese tetraoxide, ilmenite and calcium carbonate.

66. The treating fluid composition of claim 65, wherein the treating fluid composition comprises from about 4 to 85% by volume of the weighting material.

67. The treating fluid composition of claim 65, wherein the treating fluid composition comprises from about 15 to 75% by volume of the weighting material.

68. A method of treating a wellbore, comprising:
introducing into the wellbore a treating fluid comprising zeolite and a carrier fluid.

69. The method of claim 68, wherein the treating fluid is selected from the group consisting of drilling fluids, completion fluids and stimulation fluids.

70. The method of claim 68 wherein the treating fluid is selected from the group consisting of drilling muds, well cleanup fluids, workover fluids, conformance fluids, gravel pack fluids, acidizing fluids and fracturing fluids.

71. The method of claim 68, further comprising drilling, completing and/or stimulating a subterranean formation penetrated by the wellbore using the treating fluid.

72. The method of claim 71 further comprising producing fluid from the subterranean formation.

73. The method of claim 72, wherein the fluid produced from the subterranean formation is oil and/or gas.

74. The method of claim 68, wherein the treating fluid comprises a spacer fluid.
75. The method of claim 68, wherein the treating fluid further comprises a viscosifier.
76. The method of claim 68, wherein the treating fluid further comprises one or more of an organic polymer, dispersants, surfactants and weighting materials.
77. The method of claim 68, wherein the zeolite is represented by the formula:
$$M_{a/n}[(AlO_2)_a(SiO_2)_b] \cdot xH_2O$$
where M represents one or more cations selected from the group consisting of Na, K, Mg, Ca, Sr, Li, Ba, NH₄, CH₃NH₃, (CH₃)₂NH, (CH₃)₄N, Ga, Ge and P; n represents the cation valence; the ratio of b:a is in a range from greater than or equal to 1 and less than or equal to 5; and x represents the moles of water entrained into the zeolite framework.
78. The method of claim 68, wherein the zeolite is selected from the group consisting of analcime, bikitaite, brewsterite, chabazite, clinoptilolite, faujasite, harmotome, heulandite, laumontite, mesolite, natrolite, paulingite, phillipsite, scolecite, stellerite, stilbite, and thomsonite.
79. The method of claim 68, wherein the treating fluid comprises from about 5 to 90% by weight of the zeolite.
80. The method of claim 68, wherein the treating fluid comprises from about 60 to 70% by weight of the zeolite.
81. The method of claim 68, wherein the carrier fluid comprises a fluid selected from the group consisting of an aqueous fluid, hydrocarbon-based liquids, emulsions, acids and mixtures thereof.
82. The method of claim 81, wherein the carrier fluid comprises water.
83. The method of claim 68, wherein the treating fluid comprises from about 45 to 95% by volume of the carrier fluid.

84. The method of claim 68, wherein the treating fluid comprises from about 65 to 75% by volume of the carrier fluid.

85. The method of claim 75, wherein the viscosifier is selected from the group consisting of colloidal agents, emulsion forming agents, diatomaceous earth and starches.

86. The method of claim 85, wherein the viscosifier is a colloidal agent selected from the group consisting of clays, polymers and guar gum.

87. The method of claim 86, wherein the viscosifier is a clay selected from the group consisting of kaolinites, montmorillonite, bentonite, hydrous micas, attapulgite, sepiolite, and laponite.

88. The method of claim 75, wherein the treating fluid comprises from about 5 to 80% by weight of the viscosifier.

89. The method of claim 75, wherein the treating fluid comprises from about 20 to 30% by weight of the viscosifier.

90. The method of claim 76, wherein the treating fluid comprises an organic polymer selected from the group consisting of guar gum and derivatives thereof, locust bean gum, tara, konjak, tamarind, starch, cellulose, karaya gum, welan gum, xanthan gum, galactomannan gums, succinoglycan gums, scleroglucan gums, tragacanth gum, arabic gum, ghatti gum, tamarind gum, carrageenan and derivatives thereof, carboxymethyl guar, hydroxypropyl guar, carboxymethylhydroxypropyl guar, polyacrylate, polymethacrylate, polyacrylamide, maleic anhydride, methylvinyl ether copolymers, polyvinyl alcohol, polyvinylpyrrolidone, cellulose, carboxyethylcellulose, carboxymethylcellulose, carboxymethylhydroxyethylcellulose, hydroxyethylcellulose, hydroxypropylcellulose, methylhydroxypropylcellulose, methylcellulose, ethylcellulose, propylcellulose, ethylcarboxymethylcellulose, methylethylcellulose and hydroxypropylmethylcellulose.

91. The method of claim 90, wherein the organic polymer is selected from the group consisting of hydroxyethylcellulose, carboxymethylhydroxyethylcellulose and guar gum.

92. The method of claim 91, wherein the organic polymer comprises hydroxyethylcellulose.

93. The method of claim 90, wherein the organic polymer is selected from the group consisting of welan gum, xanthan gum, galactomannan gums, succinoglycan gums, scleroglucan gums, and cellulose and its derivatives.

94. The method of claim 90, wherein the treating fluid comprises from about 0 to 6% by weight of the organic polymer.

95. The method of claim 90, wherein the treating fluid comprises from about 1 to 3% by weight of the organic polymer.

96. The method of claim 76, wherein the treating fluid comprises a dispersant selected from the group consisting of sulfonated styrene maleic anhydride copolymer, sulfonated vinyltoluene maleic anhydride copolymer, sodium naphthalene sulfonate condensed with formaldehyde, sulfonated acetone condensed with formaldehyde, lignosulfonates and interpolymers of acrylic acid, allyloxybenzene sulfonate, allyl sulfonate and non-ionic monomers.

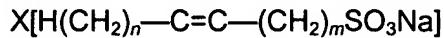
97. The method of claim 96, wherein the treating fluid comprises from about 1 to 18% by weight of a dispersant.

98. The method of claim 96, wherein the treating fluid comprises from about 9 to 11% by weight of a dispersant.

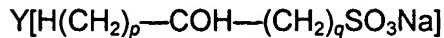
99. The method of claim 76, wherein the treating fluid comprises a surfactant selected from the group consisting of nonylphenol ethoxylates, alcohol ethoxylates, sugar lipids, α-olefinsulfonates, alkylpolyglycosides, alcohol sulfates, salts of ethoxylated alcohol sulfates, alkyl amidopropyl dimethylamine oxides and alkene amidopropyl dimethylamine oxides.

100. The method of claim 99, wherein the surfactant is selected from the group consisting of:

(a) a sodium salt of α -olefinic sulfonic acid which is a mixture of compounds of the formulas:



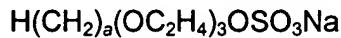
and



wherein:

n and m are individually integers in the range of from about 6 to about 16;
p and q are individually integers in the range of from about 7 to about 17; and
X and Y are fractions with the sum of X and Y being 1;

(b) a composition having the formula:

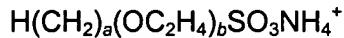


wherein:

a is an integer in the range of from about 6 to about 10;

(c) oxyalkylated sulfonate;

(d) an alcohol ether sulfate of the formula:



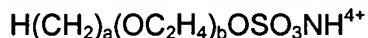
wherein:

a is an integer in the range of from about 6 to about 10; and

b is an integer in the range of from about 3 to about 10;

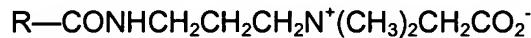
(e) cocoamine betaine;

(f) an ethoxylated alcohol ether sulfate of the formula:



wherein a is an integer in the range of from about 6 to about 10 and b is an integer in the range of from about 3 to about 10;

(g) an alkyl or alkene amidopropyl betaine having the formula:



wherein R is a radical selected from the group of decyl, cocoyl, lauryl, cetyl and oleyl; and

(h) an alkyl or alkene amidopropyl dimethylamine oxide surfactant having the formula:



wherein R is a radical selected from the group of decyl, cocoyl, lauryl, cetyl and oleyl.

101. The method of claim 99, wherein the treating fluid comprises from about 0 to 20% by volume of the surfactant.

102. The method of claim 99, wherein the treating fluid comprises from about 2 to 6% by volume of the surfactant.

103. The method of claim 76, wherein the treating fluid comprises a weighting material selected from the group consisting of barite, hematite, manganese tetraoxide, ilmenite and calcium carbonate.

104. The method of claim 103, wherein the treating fluid comprises from about 4 to 85% by volume of the weighting material.

105. The method of claim 103, wherein the treating fluid comprises from about 15 to 75% by volume of the weighting material.